

WHAT IS CLAIMED IS:

1. A data processing method comprising the steps of:

5 arranging data in bytes in a matrix direction to form information data block;

constituting an outer <sup>inner</sup> parity with respect to 32k bytes unit of the information data block as an error correction code; and

10 further adding an overall error correcting code including the outer parity in the <sup>62k</sup> 62k byte unit of the information data block.

2. A data processing method, <sup>comprising the steps of:</sup> wherein:

15 digital data is processed in bytes to configure one information data block in  $(M \times N)$  bytes of  $M$  rows  $\times$   $N$  columns;

20 data is arranged in bytes in the information data block, so that data is arranged in the data transmission order from the 0th column to the  $(N-1)$ -th column for each row while data is arranged in the data transmission order from the 0-th row to the  $(M-1)$ -th row;

25  $(K \times M)$  rows  $\times$   $N$  columns matrix block is further constructed which is a set of the information data block, and which is constituted of  $K$  information data blocks composed of information data blocks from the 0-th information data block to the  $(K-1)$ -th information data block which continue in the data transmission

order;

on each column of  $(K \times N)$  bytes of the matrix block, an error-correcting word  $PO-b\{(K/2) \times Q \text{ bytes}\}$  is created with respect to the  $(K/2) \times (m_i + m_j)$  bytes which is constituted by aggregating the even-number rows and the odd-number rows specified in the  $K$  information data block order, and an error-correcting word  $PO-b\{(K/2) \times Q\}$  bytes is created with respect to the  $(K/2) \times (m_j + m_i)$  bytes which is constituted by aggregating the remaining even-number rows and the odd-number rows specified in the  $K$  information data blocks;

$PO-a$  and  $PO-b$  are scattered and arranged into  $K$  information data blocks constituted of  $(M \times N)$  bytes of  $N$  rows and  $N$  columns so that

each column of  $N$  columns is formed as two sets of Reed-Solomon code  $PO$  of  $(K/2) \times (m_i + m_j) + Q$  bytes and  $(K/2) \times (m_j + m_i) + Q$  bytes (however,  $M = m_i$  (the number of even-number rows) +  $m_j$  (the number of odd-number rows) and ( $Q$  is an integer of 1 or more)); and

the error-correcting word of  $P$  bytes is further added for each row of  $N$  bytes;

whereby as an overall block an error-correcting product code block is realized which constitutes  $(K \times (M + Q)) \times (N + F)$  or  $(K \times (M + 2Q) \times (N + P))$  bytes Reed-Solomon error-correcting word having  $K$  information data block of  $(K \times M \times N)$  bytes as information portion.

3. The processing method according to claim 2,  
wherein when M is an even number, and Q is 1,

the even number rows of the even-number-th  
information data block and the odd-number rows of the  
odd-number-th information data block are aggregated to  
create the PO-a while

the odd number rows of the even-number-th  
information data block and the even number rows of the  
odd-number-th information data block are aggregated to  
create PO-b.

4. The data processing method according to  
claim 2, wherein when Q is 2 or more, and the M is an  
even number, the even number rows of the even-number-th  
information data blocks and the odd-number rows of the  
odd-number-th information data blocks are aggregated to  
create the PO-a while

the odd number rows of the even-number-th  
information data blocks and the even number rows of the  
odd-number-th information data blocks are aggregated to  
create PO-b.

5. The data processing method according to  
claim 2, wherein when Q is 2 or more and M is an even  
number, the even-number rows of all the information  
data blocks are aggregated to create the PO-a while the  
odd-number rows of all the information data blocks are  
aggregated to create the PO-b.

6. A data processing apparatus, <sup>comprising</sup> wherein:

digital data is processed in bytes to configure one information data block in  $(M \times N)$  bytes of  $M$  rows and  $N$  columns;

5 data is arranged in bytes in the information data block, so that data is arranged in the data transmission order from the 0th column to the  $(N-1)$ -th column for each row while data is arranged in the data transmission order from the 0-th row to the  $(M-1)$ -th row;

10  $(K \times M)$  rows  $\times$   $N$  columns matrix block is further constructed which is a set of the information data block, and which is constituted of  $K$  information data blocks composed of information data blocks from the 0th information data block to the  $(K-1)$ -th information data block which continue in the data transmission order;

15 on each column of  $(K \times N)$  bytes of the matrix block, an error-correcting word  $PO-a\{(K/2) \times Q \text{ bytes}\}$  is created with respect to the  $(k/2) \times (m_i + m_j)$  bytes which is constituted by aggregating the even-number rows and the odd-number rows specified in the  $K$  information data block order, and an error-correcting word  $PO-b\{(K/2) \times Q\}$  bytes is created with respect to the  $(K/2) \times (m_j + m_i)$  bytes which is constituted by aggregating the remaining even-number rows and the odd-number rows specified in the  $K$  information data blocks;

25  $PO-a$  and  $PO-b$  are scattered and arranged into  $K$  information data blocks constituted of  $(M \times N)$  bytes of

M rows and N columns so that

each column of N columns is formed as two sets of Reed-Solomon code PO of  $(K/2) \times (m_i + m_j) + Q$  bytes and  $(K/2) \times (m_j + m_i) + Q$  bytes (however,  $M = m_i$  (the number of even-number rows) +  $m_j$  (the number of odd-number rows) and (Q is an integer of 1 or more)); and

the error-correcting word of P bytes is further added for each row of N bytes;

whereby as an overall block an error-correcting product code block is realized which constitutes  $(K \times (M + Q) \times (N + P))$  or  $(K \times (M + 2Q) \times (N + P))$  bytes Reed-Solomon error-correcting word having K information data blocks of  $(K \times M \times N)$  bytes as information portion.

7. A recording medium, wherein an error-correcting product code is recorded with the data processing method according to claim 1 or 2.

8. A data processing apparatus comprising a step of transmitting an error-correcting product code constructed with the data processing method according to claim 1 or 2.

9. A data reproducing method comprising the steps of:

receiving an error-correcting constructed with the 15 data processing method according to claim 1 or 2;

subjecting the block to rearrangement of rows of the blocks; and

10. A data reproducing apparatus comprising:

means for reproducing each row that has been processed with the error processing means at the arrangement position at the time of the error-correcting product code block.